User's manual

Pressurized enclosure system

F840

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The symbols WARNING, CAUTION, NOTE

Warning	**This symbol warns of a serious hazard. Failure to observe this warning may result in death or the destruction of property.**
Caution	**This symbol warns of a possible failure. Failure to observe this caution may result in the total failure of the device or the system or plant to which it is connected.**
Note	**This symbol highlights important information.**

Safety Measures: to read and to comply

Warning	**Warning! Extreme caution is advised when handling this device. High electrical discharge is possible and can be fatal.** Work on electrical installations and apparatus in operation is generally forbidden in hazardous locations, with the exception of intrinsically safe circuits. In special cases work can be done on non-intrinsically safe circuits, on the condition that during the duration of such work no explosive atmosphere exists. Only explosion protected certified measuring instruments may be used to ensure that the apparatus is voltage-free. Grounding and short-circuiting may only be carried out, if there is no explosion hazard at the grounding or short circuit connection.
Warning	**Danger of static charge!** **Clean only with humid cloth!** **Do not open when an explosive dust atmosphere is present!**

1 Operation instruction for Explosion protected device

Application and Standards

This instruction manual applies to explosion-protected devices of types below. This apparatus is only to be used as defined and meets requirements of IEC/EN 60 079 particularly IEC/EN60 079-14 "electrical apparatus for potentiality explosive atmospheres".

Use this manual in hazardous locations, which are hazardous due to gases and vapours according to the explosion group and temperature class as stipulated on the type label. When installing and operating the explosion protected distribution and control panels you should observe the respective nationally valid regulations and requirements.

General Instructions

Work on electrical installations and apparatus in operation is generally forbidden in hazardous locations, with the exception of intrinsically safe circuits. In special cases work can be done on non-intrinsically safe circuits, on the condition that during the duration of such work no explosive atmosphere exists.

Only explosion protected certified measuring instruments may be used to ensure that the apparatus is voltage-free. Grounding and short-circuiting may only be carried out, if there is no explosion hazard at the grounding or short circuit connection.

To achieve an impeccable and safety device operation, please take care for adept transportation, storage and mounting, as well as accurate service and maintenance. Operation of this device should only be implemented by authorised persons and in strict accordance with local safety standards.

The electrical data on the type label and if applicable, the "special conditions" of the test certificates BVS 15 ATEX E 048 X and IECEx BVS 15.0037 X are to be observed.

For outdoor installation it is recommended to protect the explosion protected distribution and control panel against direct climatic influence, e.g. with a protective roof. The maximum ambient temperature is 40°C, if not stipulated otherwise.

Terminal compartment in Increased Safety

When closing, it is to be ensured that the gaskets of the terminal compartment remain effective, thus maintaining degree of protection IP 54 according to IEC/EN 60529. Close unused entries by impact-proof stopping plugs, which are secured against self-loosening and turning.

Maintenance Work

The gaskets of Ex e enclosures are to be checked for damages and replaced, if required. Terminals, especially in the Ex e chamber are to be tightened. Possible changes in colour point to increased temperature. Cable glands, stopping plugs and flanges are to be tested for tightness and secure fitting.

Intrinsically Safe Circuits

Erection instructions in the testing certificates of intrinsically safe apparatus are to be observed. The electrical safety values stipulated on the type label must not be exceeded in the intrinsically safe circuit. When interconnecting intrinsically safe circuits it is to be tested, whether a voltage and/or current addition occurs. The intrinsic safety of interconnected circuits is to be ensured. (IEC/EN 60079-14, section 12)

2 General requirements to pressurized enclosure system F840

The pressurized enclosure control device (FS840) can be combined with every Ex pzc- housing that full fills the following requirements.

2.1 General requirements

1 The Ex pzc- system must be inspected by a skilled person of accordance to IEC/EN 60079 –2, IEC/EN 60079 –14 and this manual.

2 Mount the solenoid valve (purging medium input) and control unit FS840 to an maximum of distance (optimal arrangement is diagonal)

3 The operator must not do any technical changes to the control unit FS840. Any change will invalidate the conformity statement BVS 15 ATEX E 048 X and IECEx BVS 15.0037 X.

4 Any maintenance activities has to be done by Gönnheimer Elektronic GmbH

5 Corrupt Ex p- pipe connections have to be repaired immediately

6 The introduction of flammable gas into the Ex pzc- housing, e.g. for gas analyser application, is **prohibited**.

2.2 Mechanical requirements to the Ex pzc- housing

1 Regard particularly IEC/EN 60079-2, section 7

2 The Ex pzc- housing must hold the 1,5 – fold of the maximum pressure, which can be reached inside of the cabinet, 2 mbar at least. The operator has to define the maximum pressure of the housing and has to program this pressure value as monitored max. pressure into the FS840.

3 The Ex pzc- housing must pass a impact test according IEC/EN 50021 Table 13

4 The protection class of the Ex pzc- housing must be greater than IP40.

5 Cable glands must have a protection class greater than IP54.

6 If the Ex pzc- housing has surface made of synthetics (e.g. windows) with an area greater than 100 cm², than a warning sign against electro static discharge is necessary.

Caution ! Danger of static discharge. Clean only with humid cloth!

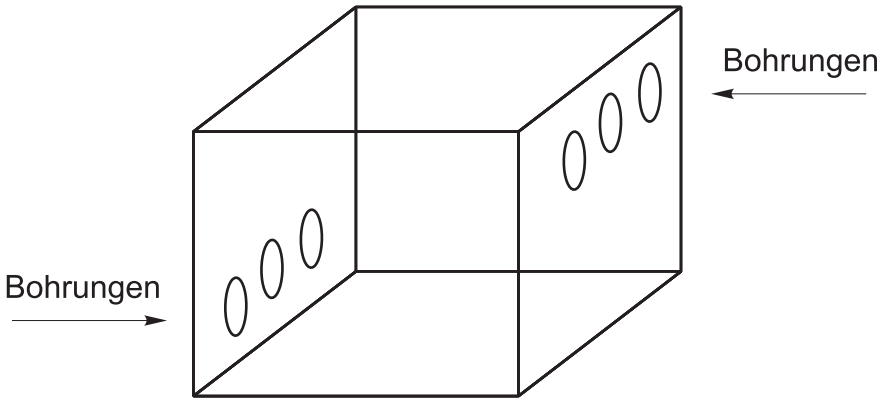
7 There is no danger of static discharge, if the synthetic surface has a thickness of ≤ 0,2 mm (Group IIC) respectively 2 mm (Group IIB) or less and it is mounted on a metallic ground.

8 If the Ex pzc- housing posses internal compartments the installer has to obey the following rules:

a) Components with a free internal volume less than 20 cm³ are not considered to be internal compartments requiring purging as long as the total volume of all such components is not more than 1% of the free internal volume of the pressurized apparatus. (*IEC/EN 60079 – 2; Abs. 5.5.4*)

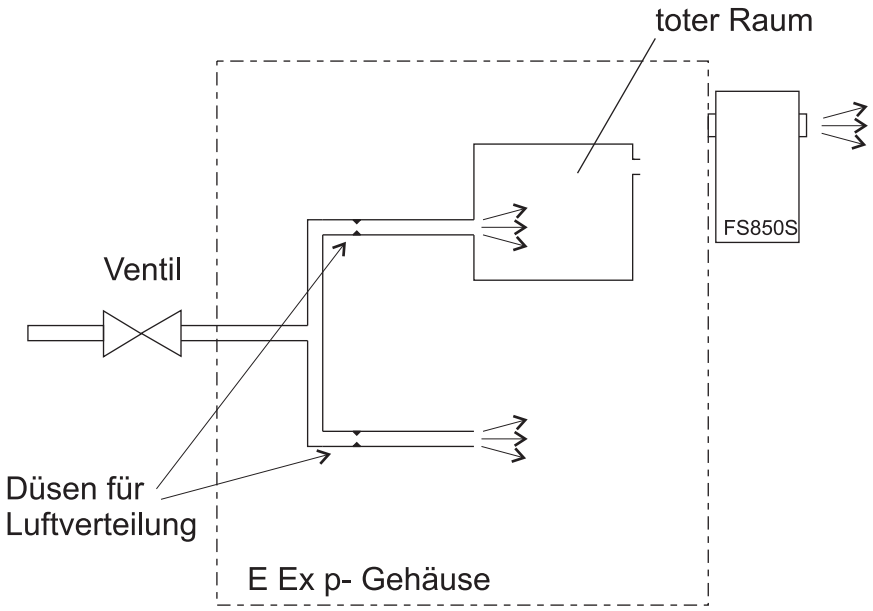
b) Provide not less than 1 cm² of vent area for each 1000 cm³, with a minimum vent size of 6,3 mm diameter should be allow for adequate purging. (*IEC/EN 60079 – 2; Abs. 5.5.2*)

c) Place the vents in a diagonal order, as shown on the picture below, with a minimum vent size of 6,3 mm diameter



d) Installer can also remove covers or doors of internal housings if they provide adequate vent diameters alternatively.

e) If the topics above are not applicable, a separate piping must be added to the internal compartment. The purge medium flow through the compartment must be high enough to make sure that the air in the compartment is exchanged at least 10 times higher. For instance:



2.3 Determination of pre- purging period

If its not sure, at power up, that the atmosphere inside of the enclosure and the appropriate pipes is below 25% of the lower explosive limit (LEL) (IEC/EN 60079 – 14 chapter 13.4), a prepurging of the pressurized enclosure is necessary.

The pre purging of the housing is prohibited, by an Ex pD system (pressurized enclosure in zone 22).

2.4 Purge medium requirements

1 The purging medium must not be derived from hazardous area, it must be contamination free (dry, free of oil and dust)

2 The temperature of the purge medium should not exceed 40°C.

3 If another purge medium than air is used, it is important to regard the minimum oxygen content of the ambient. Maybe it is necessary to install a exhaust pipe from the FS840 to out-of-door.

4 The inlet and the outlet of the purging gas should be located as far away to each other as possible.

5 The pressure lost an the solenoid valve (P_{Valve}) must not be higher than 500 mbar, while pre- purging.

2.5 Temperature class of the Ex pzc- housing

The installer has to define the maximum ambient temperature and the resulting maximum temperature class of the Ex pzc- housing.

To determine the temperature class, measure, on worst conditions, the hottest point on the surface of the Ex pzc- housing and recalculate it to the maximum ambient temperature. The minimum temperature class is the one of the FS840 and its surface temperature.

If some parts inside of the housing get hotter than the temperature class, the installer has to determine the time in which the temperature of those parts falls below the temperature class. He has to place a sign on the Ex pzc- housing with the following sentence:

Power off the apparatus and wait for x minutes for cool down !

X is the determinate time multiplied with a safety factor 1,5.

2.6 Particular requirements in zone 22 (Dust hazardous area)

2.6.1 Pre purging / cleaning of the housing

For the employment in the zone 22 the FS840 must not initialize a pre purging phase. Therefore, the automatic purging at the controller FS840 has to be deactivated.

The purging phase before the start-up of the inserted, electrical non-ex operational funds, upstream within the gas ex range, is replaced in the zone 22 by inside cleaning the housing.

2.6.2 Markings on the housing

On the housing has to be the following markings:

„WARNING: REMOVE ALL DUST FROM THE INSIDE OF THE ENCLOSURE BEFORE CONNECTING OR RESTORING THE ELECTRICAL SUPPLY“

On ex p-housings for zone 22 with doors without tools to be opened, must the following reference be attached:

„WARNING: DO NOT OPEN WHILE ENERGIZED UNLESS IT IS OBVIOUS THAT NO COMBUSTIBLE DUST IS PRESENT“

2.6.3 Special conditions in the manual of the Ex pD of system (Zone 22)

In the manual for Ex pD applications for the zone 22 the following items are supplemented:

The use of the Ex pD application within the zone 22 must take place without pre purging period phase. The automatic flushing at the controller FS840 is to be therefore always deactivated.

The system may be operated not with a single solenoid valve, but only with a leakage balance mechanism without flushing attitude.

Before start-up of the ignition capable apparatus, the inside of the housing is to be cleaned completely.

The protective class of the Ex pD housing in dust explosive area with not leading-capable dust has to be at least to IP5X, with leading-capable dust at least IP6X.

3 Introduction: simplified pressurized enclosure system

The use of simplified pressurized enclosures allows the operation of 'non explosion protected' devices in hazardous areas inside zone 2. The protection type 'pressurization' is based on the principle of maintaining a constant pressure using air or a protective gas to prevent an explosive mixture forming near the apparatus inside the pressurized enclosure.

Generally, before start-up, the pressurized enclosure must be purged with air or protective gas to remove any explosive mixture that may be inside the enclosure. This automatic procedure is called purging process.

If the operator is sure, that the atmosphere inside of the enclosure and the appropriate pipe infrastructure and the ambient of the enclosure is below 25% of the lower explosive limit (LEL) (IECEN 60079 – 14 chapter 13.4), the pre purge phase can be cancelled. The operator has the responsibility to ensure the non existence of Ex atmosphere every time by energizing the Ex pzc- system.

An simplified pressurized enclosure system consists of two components and the enclosure.

1. Control unit FS840 for process control and monitoring
2. Solenoid valve SVD.L.x or a sinter metal throttle SD840 to control air input fed by pressured air network

See chapter 2 for general requirements of pressurized enclosure and integrated ignition capable apparatus.

3.1 Pressurized enclosure system F840

The device FS840 is the control device of a F840 - pressurized enclosure system.

The control device FS840 provides all necessary functions to install a pressurized enclosure system according IEC/EN 60079-14 section 13, and. IEC/EN 60079-2 „pzc". The FS840 measures the internal pressure and alarms or powers off, if the pre- defined minimum pressure is reached. The FS840 can also pre purge the housing before automatic powering on the housing. In this case connect a digital working 2/2 way solenoid valve to the appropriate terminals. The solenoid must have a separate certification for zone 2.

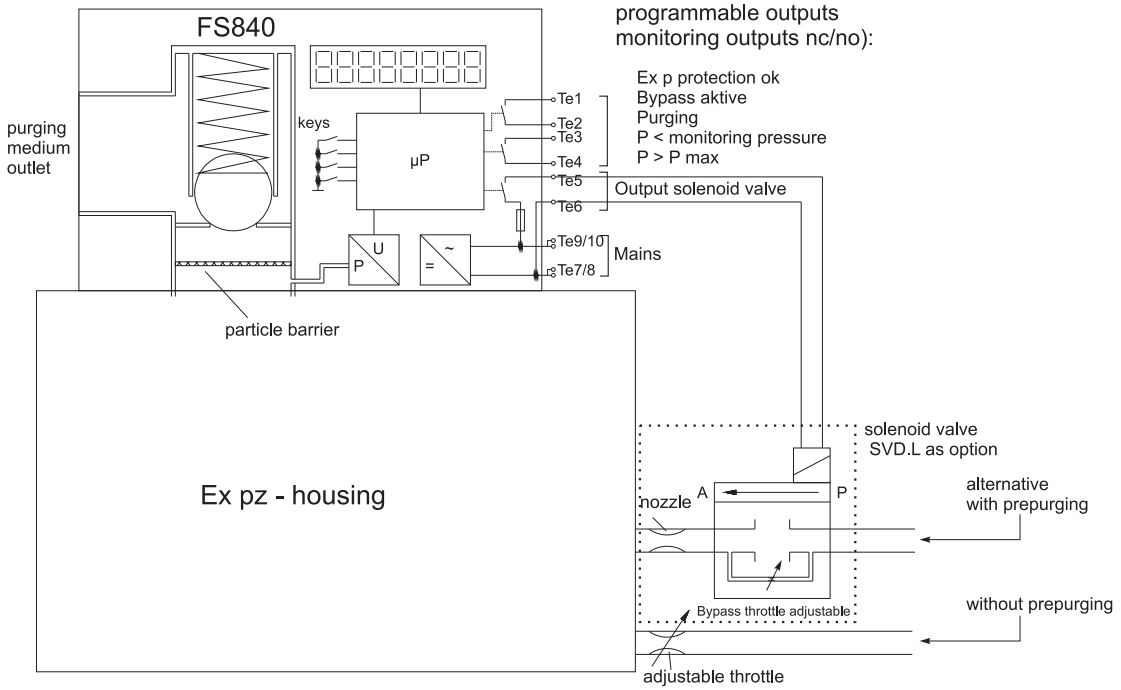


Figure 1 Block diagram

3.2 Pre- operation phase

3.2.1 Pressurized enclosure system without pre- purging

If the operator is sure, that the atmosphere inside of the enclosure and the appropriate pipe infrastructure is below 25% of the lower explosive limit (LEL) (IEC/EN 60079 – 14 chapter 13.4) at power up, he can abandon the pre purging of the enclosure in zone 2. In that case the FS840 monitors only the pressure inside of the enclosure on 0.8 mbar at minimum and maximal 22.0 at maximum. If any limit is exceed, the FS840 changes the state on relay(s) output(s).

The purge medium flows through an adjustable sinter metal throttle into the housing while reducing its pressure (see block diagram). The FS840 has an mechanical output valve which opens at approximately 5 mbar to let the purge medium out. Before this valve is a spark lattice located thus the purge medium can be exhausted directly to the hazardous area.

3.2.2 Pressurized enclosure system with pre- purging

To pre- purge the housing connect a digital working 2/2 way solenoid valve (SVD.L) to the terminal 5 and 6 of the FS840. Also configure the pre- purging period into the structure menu of the control device. After pre- purging the valve closes automatically and the adjustable throttle of the SVD.L lets a small amount of purging medium into the housing to hold pressure.

The installer can determine the pre- purging time once by doing the attenuation test according IEC/EN 50016 section 14.3.

As an alternative he can calculate the purging time without the elaborate attenuation test see below:

The purging time depends on minimum flow (Q_{min}), free internal volume (V) and the free volume of the connected pipes (Va). Final the calculated time must be multiplied by 10. The purging time t_{purge} is:

$$t_{purge} = \frac{10 \times (V + Va)}{Q_{\min}}$$

The minimum flow (Q_{min}) depends on the minimum pre pressure (P_{premin}), the pressure lost at the valve (P_{Valve}), internal pressure of the Ex pzc- housing (P_{Int}) and the nozzle diameter (d). The pressure lost at the valve (P_{Valve}) should not exceed 500 mbar. The maximum internal pressure of the housing is defined to be less than 20 mbar. The minimum flow Q_{min} can be calculated by:

$$Q_{\min} = \sqrt{\frac{2 \times (P_{pre\min} - P_{Valve} - P_{Int})}{\rho}} \times \frac{d^2 \times \pi}{4}$$

ρ is the density of the purging medium. The density of air is ρ =1,2393 kg/m^3, the density of nitrogen is 1,25 kg/m^3. WE calculate the ρ of air for all gases, because the difference is only 3%.

The installer can calculate the purging time of ist own or he can use the automatic calculation in the menu of the FS840 (see also section 5.6.1)

Example:

$$Q_{Beispiel} = \sqrt{\frac{2 \times (2 - 0{,}5 - 0{,}025) \times 10^5 \frac{kg\frac{m}{s^2}}{m^2}}{1{,}293\frac{kg}{m^3}}} \times \frac{0{,}002^2 \times m^2 \times \pi}{4}, \qquad mit\ 1\ bar = 10^5 \frac{kg\frac{m}{s^2}}{m^2}$$

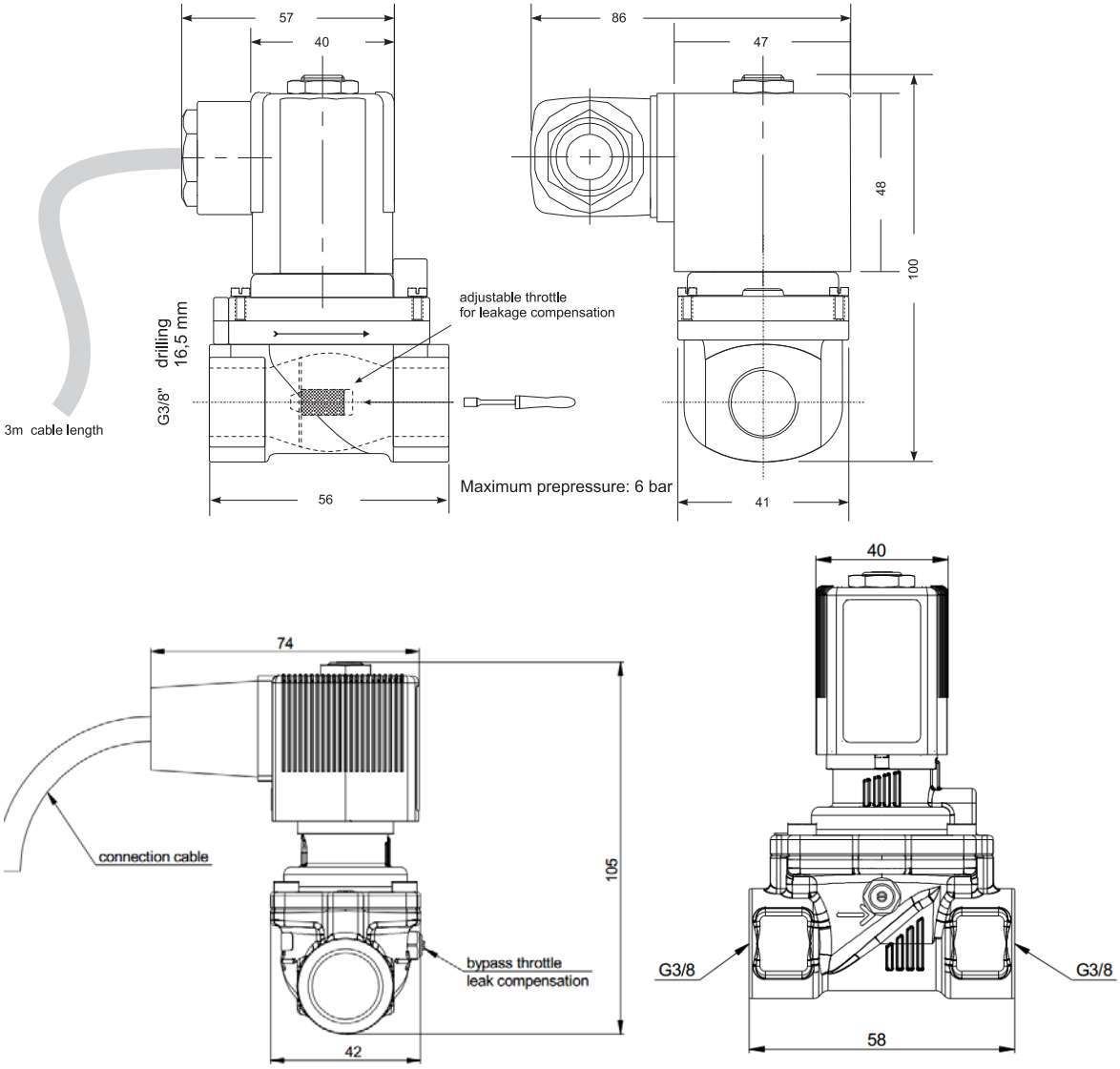
$$Q_{Beispiel} \approx 0{,}0015 \frac{m^3}{s} \approx 1{,}5 \frac{l}{s}$$

3.3 Operation mode “Leakage compensation”

The FS840 works after the pre purging phase or without pre purging phase immediately after the voltage supply in the mode of operation "leakage compensation ".

In this mode of operation will maintain after an overpressure (at least 0.8 mbar) within the Ex p cabinet. This cabinet minimum pressure as well as also a cabinet maximum pressure are programmable and are monitored constantly.

Leakage losses are compensated by a small bypass. This bypass is integrated in the valve and mechanically adjustable (diameter 0.3... 1 mm).



SVD.L.x-Axx (top), SVD.L.x-AIxx (bottom)

3.4 Conformity with Standards

The ex proofed control device FS840 meets requirements of listed standards in the attachment (Declaration of conformity). They were developed, manufactured and tested in accordance with state-of-the-art engineering practice and ISO9001:2008.

4 Mounting and Connecting

4.1 Mounting, Dimensions

4.1.1 Control device FS840

The control device FS840 is suitable for mounting in hazardous area zone 2. The installer can place it in or outside of the Ex pzc- housing.

The installer can mount the control device using the 4 mounting holes in the housing rear, but the fixing on the air in- or outlet is sufficient.

While mounting, observe local safety guidelines and the regulative: IEC/EN 60079-14

The reference output (M5 screw on the left side of the control unit) must have contact the ambient pressure

If the control unit is built into the Ex pz- housing the reference output must to connected to the ambient with a pipe or tube.

Additional see general requirement to pressurized enclosure system in section 2 in this manual.

4.1.2 Spark barrier

The control unit has a spark barrier according to IEC/EN 60079-2. The exhaust air can be diverted direct to Ex area.

4.1.3 Sinter metal throttle

While operation mode “leakage compensation” a small amount of purging gas enters through the sinter metal throttle SD840 into the Ex p- housing to provide the desired overpressure. Dispensable purge gas will be exhausted (at an overpressure of 3-4 mbar) through the control unit FS850S outlet valve.

4.1.4 Optional solenoid valve for purging

The installer can mount the solenoid valve in or outside of the Ex pzc housing, see details from manufacturer documentation.

4.2 Connecting and starting

4.2.1 Connection of Ex e clamps

Min. and max. clamping torque	min. 0,3 Nm max. 0,4 Nm
Min. und Max. wire cross- section	steep: 0,2 – 2,5 mm² flexible: 0,2 – 2,5 mm²

Note the following item while connecting:

- **Mains VOLTAGE Extreme caution is advised when handling this device. High electrical discharge is possible and can be fatal.**
- **See Installation regulative IEC/EN 60079-14 as well as Conformity statement BVS 15 ATEX E 048 X and IECEx BVS 15.0037 X**
- **Do not exceed terminal safety limits of each terminal**
  See limits in technical details or declarations of conformity.
- **The internal solenoid valve fuse must be adapted to the solenoid valve**

4.2.2 Terminals of the FS840

Terminal		*Comment*
1,2		Relay contact 1
3,4		Relay contact 2
5,6		Terminal for solenoid valve
7,8	-	Mains, according to model conductor N or minus by DC
9,10	+	Mains, according to model conductor L1 or plus by DC

4.2.3 Power off relays

The control unit FS840 switches off the line voltage of the target device via the clamps 1,2 and 3,4. The switching power is 250V / 5A.

Warning

The maximum current limits (5 A) on the clamps 28,29 and 30,31 should not be exceeded at <u>any time</u>!

E.G. By an application of switched power supply a multiple higher current as the nominal max. current may occur. In this case a switching on current limitation (e.g., NTC) must be added to avoid the off-limits high current.
If this is missed the risk of the „jammed relay contacts“ and within the loss of the explosion protection exists!!

5 Configuration and operation

Configure the FS840 with the 4 keys and the display.

5.1 Display

The built-in 8- figures display indicates operation modes, present pressure or flow rate data, as well as malfunctions.

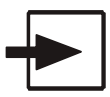
5.2 Alarm monitor Lamp

The FS840 has a monitor lamp below the display. This red lamp (LED) blinks if the pressure inside of the Ex p- housing is below the defined minimum pressure. In bypass mode the LED is permanently on and in normal operation the lamp is off.

	Lamp	Meaning
✳	**flashing**	**The pressure inside of the cabinet is below 0.8 mbar !** **No explosion proof inside cabinet!**
✹	**Constant on**	**Bypass mode is active – no explosion proof inside cabinet!**
⊗	**Constant off**	**Ex protection is "OK" = normal operation**

5.3 Keyboard

The four multi-functional keys have different meanings and functions depend on the present operation mode.

Key	*Operation mode*	*Function*
 „Shift right"-button	normal operation running menu	none Shift cursor one position right.
BYPASS *„Up"-button*	normal operation running menu	Activates Bypass; i.e. enable toggle ignition-capable device on or off independently of the purging status **(Be sure, that no explosive atmosphere is in environment)** Get next menu item
INFO *„Down"-button*	normal operation running menu	Changes indication of the display: present pressure, flow rate, remaining purge time and present state of the purging system Get previous menu item
MENÜ  *„Enter"- button*	normal operation running menu	Enters main menu Initiates and confirms parameter input

5.4 Indication modes during normal operation

The actual status of the Ex pzc- System is generally shown on the info display. Using the “Down-button the user can toggle to the pressure and remaining purge time indication.

5.5 How to enter and leave the bypass mode

Caution

Utilizes bypass only, if it is sure that no explosive atmosphere is inside the cabinet!

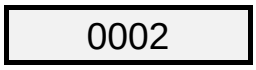
Fire certificate required!

The bypass mode is denied, if it is possible that a explosive atmosphere can arise inside the Ex p- housing!

Standard situation is the FS840 is in normal operation.

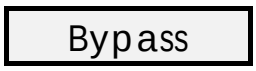
The origin state is normal operation, the Ex p housing can be purged, un-purged or while purging.

The bypass code is needed



The ex works Bypass code is ‘0002’.

Enter is right code using the arrow keys and confirm with the ENTER- key.



The bypass mode is now active.

If the control unit is set to “automatic on” the display shows “bypass” and “On” alternately and the relay contacts (Ter. 11,12 and 13,14) are closed.

Now you can toggle the relay contacts by pressing the “right-“ button. Remark: if the E/A- code is unequal to zero, you must enter them each time you want to change the relay contacts state.

Note

The bypass will be deactivated in the same way.

5.6 Configuration

You must configure and enter the parameters of the control unit FS840 to achieve a desired mode of operation. All parameters of the control unit are structured in form of a menu.

The Master Code (M-Code) ex works is: 0001

5.6.1 The menu format

In the following table below shows explanations of the menu items. The table works as a reference guide for programming the desired system structure and to set the appropriate parameters correctly. The menu items are roughly sorted by class.

Please note that the viewable conditions of parameters are not included.

Classification 1.Level	2.Level	3.Level	Description, Explanation
Language			Define the language shown on the display of the FS840 in this menu item. Available languages are: German, English, French, Dutch, Spanish
Structur	Purging	Purg. Y.	„Purg. Y.“ means that the Ex pzc-housing will be pre purged before “Ex Ok” Message is set
		Purg. N.	„Purg.N.“ means that the housing will not be pre- purged. The “Ex Ok” Message is set and the min. Pressure is monitored
	Auto	Auto. Y.	***Automatic purging time Yes:*** The FS840 calculates the purging time out of pre- pressure, nozzle diameter
		Auto.N.	***Automatic purging time No*** (= Enter the purging time directly):
	O1 Func.	none	Define the function of output ***O1 (te. 1/2)***.
		O-Ex ok	***Explosion protection is ok:*** The output is set, if the pressure is higher than minimum.
		O-Bypas	***Bypass- output***: The output is high, if the bypass is active
		O-Purg.	***Purging- output***: The output is high as long the pre- purging procedure is running
		O-.Signal	***Signal pressure- output:*** the output is high, if the actual pressure inside of the Ex pzc- housing is below the signal pressure level
		O-Pmax	***Maximum pressure- output:*** the output is high, if the actual pressure inside of the Ex pzc- housing is higher the maximum pressure level
	O2 Funkt.	none	Define the function of output ***O2 (te. 3/4)***. See functions O1 above
	O2 no/nc.	no	define the circuit-opening connection of output O1 (terminal (1/2) no (= normal open) nc (=normal closed)
	O2 no/nc.	no	define the circuit-opening connection of output O2 (terminal (3/4) no (= normal open) nc (=normal closed)
Param.	Pur. Time		***Purge time [h/min/sec]:*** Enter the purge time directly. The parameter only appears, if “automatic = no “ is chosen. If „automatic = Yes“ the following parameters will be asked: • ***Purge volume [dm³]***
	Pur. Vol.		

	Pre.-Pres	• ***Pre- pressure [bar]:*** pressure of the purge medium pipe or pre pressure controller
	Nozzle	• ***Internal nozzle diameter [mm]:***
	Min.Pres.P	• ***Minimum pressure while pre-purging [mbar]:*** During pre- purging procedure the FS840 monitors a increased pressure inside of the Ex pzc-housing to achieve the defined flow on the output valve. This increased pressure is monitored with this parameter (range = 7.0 mbar ... max. pressure)
	Min.Pres.R	***Minimum pressure at normal operation [mbar]:*** Monitored minimum pressure
	Max. Pres	***Maximum pressure at normal operation [mbar]:*** Monitored maximum pressure
	Sig. Pr.	***Signal pressure at normal operation [mbar]***
Codes	M-Code	***Menu code:*** Code word to start the main menu. **Ex works: "0001"** It is not possible to deactivate this code with „0000".
	By-Code	***Bypass code:*** Code word to start bypass mode. The code can be disabled with „0000" . The sequence „9999" disables the bypass in general

6 Annex

6.1 Terminals and Terminals Ex- limits

Terminal	Voltage	Current	Power	Comment
1, 2	U_m = 250V AC U_m = 250V AC U_m = 30V DC	I_m = 5A bei AC1 I_m = 1,2A bei AC15 I_m = 5A bei DC1	P_m = 1500VA P_m = 300VA P_m = 150W	Relay contact 1
3, 4	U_m = 250V AC U_m = 250V AC U_m = 30V DC	I_m = 5A bei AC1 I_m = 1,2A bei AC15 I_m = 5A bei DC1	P_m = 1500VA P_m = 300VA P_m = 150W	Relay contact 2
5, 6				Terminal for solenoid valve
7/8, 9/10	U_n = 230V AC U_n = 115V AC U_n = 24V DC			mains

Table 1: Terminals Ex- limits

6.2 Technical details

		Control unit FS840
General	Mounting	inside hazardous area
	Ex-protection class	II 3 G, Ex nA nC ic [pzc] IIC T6 Gc ; T_a = 40°C II 3 G, Ex nA nC ic [pzc] IIC T5 Gc ; T_a = 60°C II 3 D, Ex tc ic [pzc] IIIB T85°C Dc ; T_a = 60°C II 3 D, Ex tc ic [pzc] IIIC T85°C Dc ; T_a = 60°C
	Certificates	BVS 15 ATEX E 048 X and IECEx BVS 15.0037 X
Housing	Environment protection	IP65 (Remark: without considering purge medium outlet)
	Dimensions	H x W x D: 120 mm x 122 mm x 90 mm
Electrical specifications	Material	Aluminium, lacquered / Ral 7035
	Main voltage	AC: 230V, 115V ; 48 ..62 Hz +/- 10% DC: 24V +/- 10%
	Power consumption	ca. 2 VA, without solenoid valve
	Working circuits Terminal 1-4	U_m = 250V AC, I_m = 5A bei AC1, P_m = 1500VA U_m = 250V AC, I_m = 1,2A bei AC15, P_m = 300VA U_m = 30V DC; I_m = 5A bei DC1, P_m = 150W
	Solenoid valve te. 5/6	Output voltage is equal to mains, protected by internal fuse
Ex e terminals	min. und max. clamping torque	min. 0,3 Nm max. 0,4 Nm
	Min. und Max. wire cross- section	steep: 0,2 – 2,5 mm² flexible: 0,2 – 2,5 mm²
Pneumatic	Pressure range	0 ... 22 mbar
Mounting	Environment temperature	-20°C ...+40°C at T6 -20°C ...+60°C at T5
	Humidity	5-95%, non-condensing
Ex p Configuration	Parameter input	LC-Display, menu guided Different languages : German, English, French, Dutch, Spanish

See certificates BVS 15 ATEX E 048 X and IECEx BVS 15.0037 X for more information.

Valid air pressure values

Tolerance	+/- 5% v. measure point
Maximal pressure (P max.)	Adjustable: 0 mbar ... 22 mbar
Minimal pressure (P min. (pre purging phase)	Adjustable: 7 mbar ... 22 mbar
Minimal pressure (P min. (normal operation, Leakage compensation)	Adjustable: 0,8 mbar ... 22 mbar
Alarm pressure (P alarm.)	Adjustable: 0 mbar ... 22 mbar

6.3 Dimensions

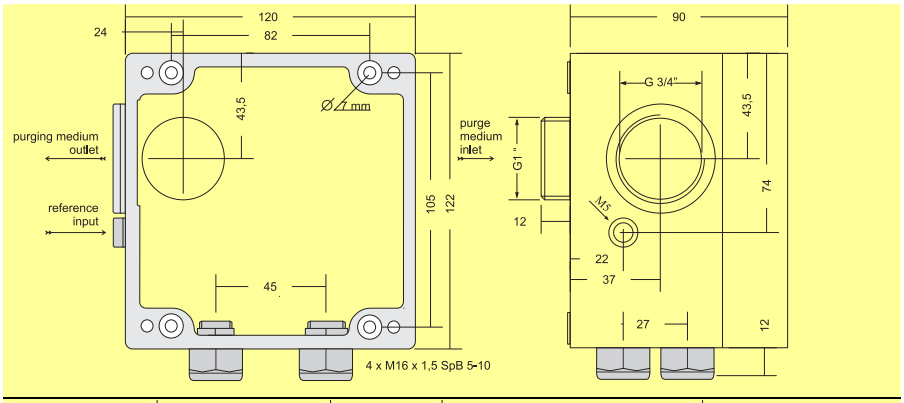


Figure 2:
Dimensions FS840 [mm]

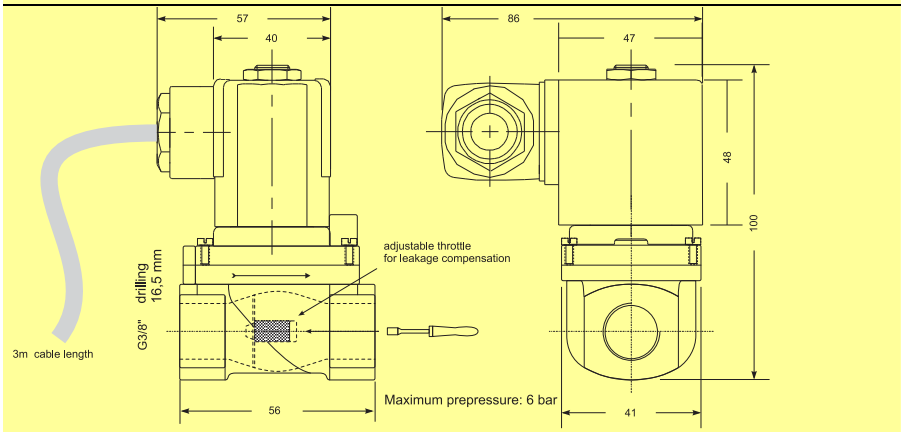
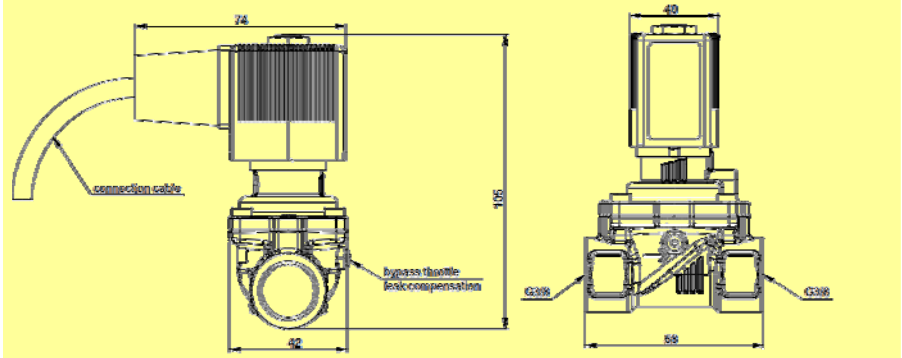


Figure 3: solenoid valve
SVD.L.x
-Axx



SVD.L.x
-AIxx

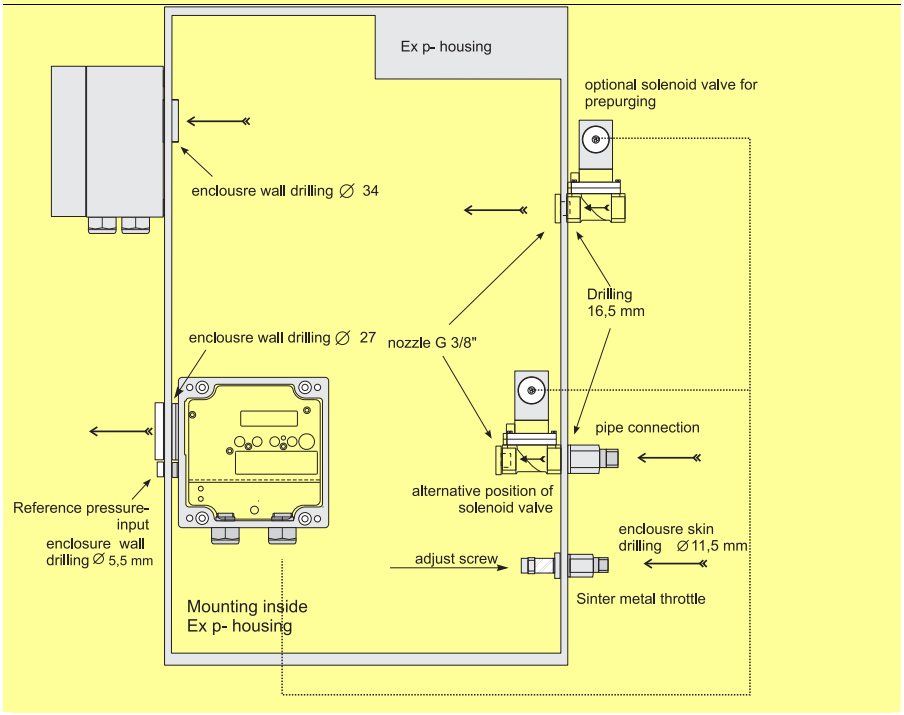


Figure 4:
Mounting examples

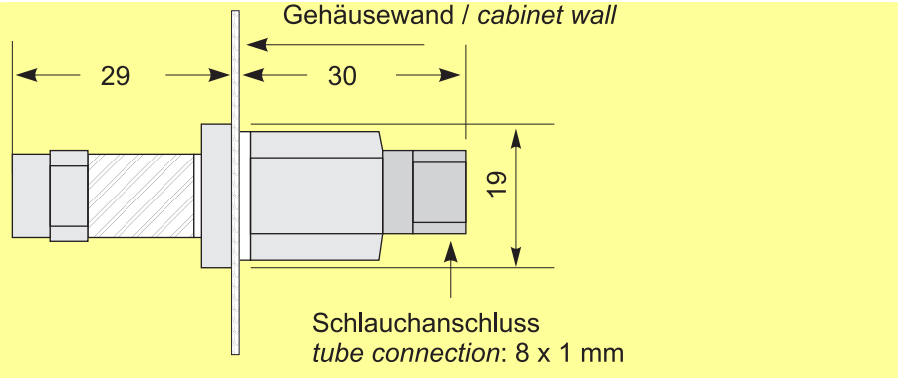


Figure 5:
Sinter metal throttle SD840

6.4 Flow chart

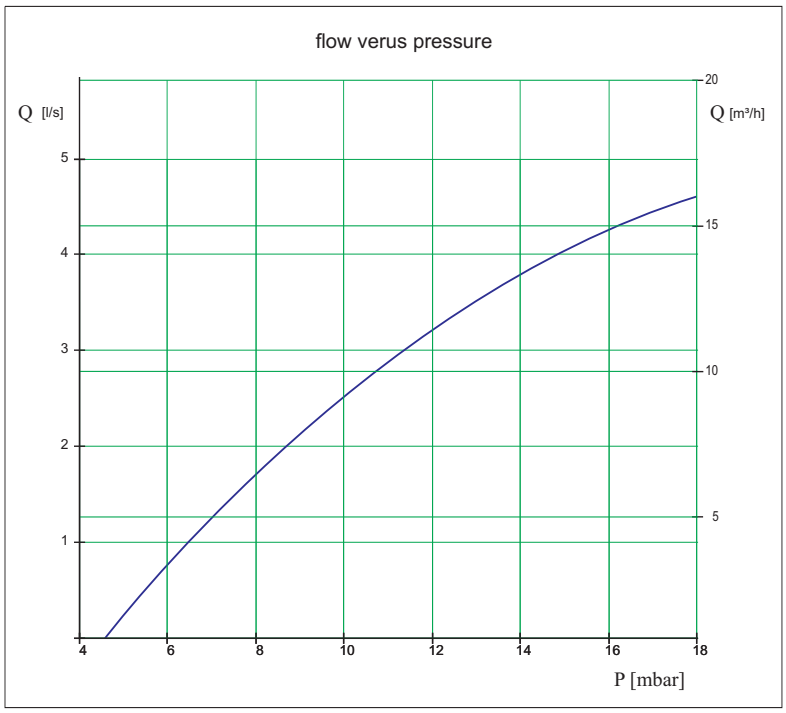


Figure 6: pressure versus flow inside cabinet

The diagram shows the relationship between pressure inside of enclosure and the output flow. The diagram is only valid, without reducing input or output diameters as well as flow reducing pipes.

6.5 Flow rate table

The table below shows the flow rate depending on pre- pressure and nozzle diameter

Pressure	Flow rate [l/s] ρ_{Air} = 1.293 kg/m^3							
[bar]	**Nozzle diameter [mm]**							
[10^{5}Pa]	**0,3**	**0,5**	**0,7**	**1**	**1,5**	**2**	**3**	**4**
1,5	**0,0275**	**0,076**	**0,149**	**0,304**	**0,693**	**1,208**	**2,676**	**4,653**
2	**0,0338**	**0,094**	**0,184**	**0,374**	**0,838**	**1,48**	**3,27**	**5,651**
2,5	**0,0391**	**0,109**	**0,213**	**0,433**	**0,968**	**1,708**	**3,759**	**6,471**
3	**0,0438**	**,0121**	**0,238**	**0,484**	**1,063**	**1,908**	**4,186**	**7,177**
3,5	**0,048**	**0,133**	**0,261**	**0,53**	**1,195**	**2,087**	**4,569**	**7,804**
4	**0,0518**	**0,144**	**0,282**	**0,573**	**1,28**	**2,252**	**4,917**	**8,37**

4,5	**0,0554**	**0,154**	**0,301**	**0,612**	**1,367**	**2,404**	**5,239**	**8,883**

6.6 Problems and solutions

Code forgotten	• turn the device off (e.g. disconnect from power supply) • press the very right (red) key, turn the device on • hold the key, until "RESET" appears • all data is set to ex work defaults

6.7 Type codes

- Control unit FS840

FS840	**.**	**.**
mains:		
230V AC	**.0**	
115V AC	**.2**	
24V DC	**.6**	
Maximum pressure :		
0 – 18 mbar …….……..		**.0**
0 – 27 mbar …….……..		**.1**

We can offer you the complete Solution: System F840 with Ex p- housing and mounting of your apparatus inclusive system test and ATEX/IECEx report

- Outlet valve / vent LA830

Vent LA830	.	.
Size:		
Diameter 40 mm	**.0**	
Type:		
Standard		**.0**
G1" inside thread (for outdoor applications e.g. with elbow pipe)		**.1**

Fixing nut and gasket in scope of delivery

- Solenoid valve SVD.L.x

Solenoid valve: SVD.L	**.**	**-AI**	**.**	**.0**
Inner diameter / nozzle:				
2 mm	**.2**			
3 mm	**.3**			
4 mm	**.4**			
n mm	**.n**			
Scope				
Europe (ATEX).....		**-AI**		
Mains				
230V AC.....			**.0**	
115V AC.....			**.2**	
24 V DC.....			**.6**	

- adjustable Sinter metal throttle **SD840**

6.8 Transport, Storing, Repairs und Disposal

Transport	Vibration-free in origin package, do not pitch, handle carefully
Storing	Store the device dry, inside of the origin package
Disposal	When the explosion proof multipurpose distribution, switching and control units are eventually disposed of, the national regulations governing the disposal of waste materials in the country concerned must be rigorously observed.
Repairs	Defective parts may only be replaced by the Manufacturer or by personnel specially trained and supervised by the Manufacturer. Only genuine spare parts from the Manufacturer may be fitted.

6.9 Ex –protection class of control unit FS840

	II 3 G, Ex nA nC ic [pzc] IIC T6 Gc ; T_a = 40°C **II 3 G, Ex nA nC ic [pzc] IIC T5 Gc ; T_a = 60°C** **II 3 D, Ex tc ic [pzc] IIIB T85°C Dc ; Ta = 60°C** **II 3 D, Ex tc ic [pzc] IIIC T85°C Dc ; Ta = 60°C**

6.10 List of Parameters

System identification	Installation no.:	Date:	
FS840. .	Production no.:	Solenoid valve	

Inputs	**Description**	**Display**	**Value/ state**	
Language	FS840 language	Language		
Structure				
Purging	Should the FS840 pre- purge the pressurized enclosure ?	Purging	Purg. Y. ❑	Purg. N. ❑
Purging method	Automatic or direct purging volume input	Auto	Auto. Y. ❑	Auto. N. ❑
Output function O1		O1 Func.	❑ none ❑ Exp. Protect. Ok ❑ Bypass	❑ Purging out ❑ Signal pressure ❑ Max.pressure
Output function O2		O2 Func.	❑ None ❑ Exp. Protect. Ok ❑ Bypass	❑ Purging out ❑ Signal pressure ❑ Max.pressure
O1 circuit opening connection		O1 no/nc	no ❑	nc ❑
O2 circuit opening connection		O2 no/nc	no ❑	nc ❑
Parameters	Purge time	Pur. Time		
	Purge volume	Pur. Vol.		
	Pre pressure	Pre.-Pres		
	Internal nozzle diameter	Nozzle		
	Minimum pressure while purg-ing	Min. Pres.P		
	Minimum pressure at normal operation	Min. Pres.R		
	Pressure monitor, maximum pressure	Max. Pres		
	Pressure monitor, signal pressure	Sig. Pr.		
Codes	Code for main menu	M-Code		
	Code for bypass	By-Code		

EG-Konformitätserklärung

Declaration of conformity / Déclaration de conformité

Communauté Européenne

Anbieter:
Supplier:
Fournisseur
Gönnheimer Elektronic GmbH

Anschrift:
Address:
Adresse:
Gewerbegebiet Nachtweide
Dr.-Julius-Leber-Straße 2
67433 Neustadt/Weinstraße

Produkt:
Product:
Produit:
FS830 / FS840
Überdruckkapselungssteuergerät

Das oben beschriebene Produkt erfüllt die Schutzanforderungen der folgenden EG-Richtlinien / the product described above complies with the following EG- rules / le produit décrit ci-dessus accomplit CU- réglementations

2004/108/EG, 93/68/EWG, 94/9/EG

und ist konform mit / and is in conformity with / et est conforme á:

EN 60079-0:2012 + A11:2013, Allgemeine Anforderungen
EN 60079-2:2014, Überdruckkapselung „p“
EN 60079-11:2012, Eigensicherheit „i“
EN 60079-15:2010, Zündschutzart „n“
EN 60079-31:2014, Schutz durch Gehäuse „t“
EN 1127-1:2011, ATEX- Grundnorm
EN 61000-6-4:2007 + A1:2011, Fachgrundnorm Störaussendung: Industriebereich
EN 61000-6-2:2005 + AC:2005, Fachgrundnorm Störfestigkeit: Industriebereich

zusätzliche Angaben / additional information / informations supplémentaires:

Qualitätsmanagement- System nach ISO EN DIN 9001:2008
Anerkanntes Qualitätssicherungssystem nach Richtlinie 94/9/EG
Überwachung des QM-Systems durch TÜV- CERT-Zertifizierungsstelle; CE: [0044]

EG- Baumusterprüfbescheinigung / EC- Type certification / Attestation d’examen ce de type

BVS 15 ATEX E 048 X
DEKRA EXAM GmbH
Dinnendahlstraße 9
44809 Bochum

Diese Konformitätserklärung ist gültig für alle Produkte, die ab dem Datum der Unterzeichnung in Verkehr gebracht werden

Neustadt, den 16.06.2015

Gönnheimer (Geschäftsführer)

(1) Baumusterprüfbescheinigung

(2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - Richtlinie 94/9/EG

(3) Nr. der Baumusterprüfbescheinigung: **BVS 15 ATEX E 048 X**

(4) Gerät: **Überdruckkapselungssteuergerät Typ FS830 / FS840**

(5) Hersteller: **Gönnheimer Elektronic GmbH**

(6) Anschrift: **Dr.-Julius-Leber-Str. 2, 67433 Neustadt an der Weinstraße**

(7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage zu dieser Baumusterprüfbescheinigung festgelegt.

(8) Die Zertifizierungsstelle der DEKRA EXAM GmbH bescheinigt, dass das Gerät die grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption von Geräten der Kategorie 3 zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie erfüllt. Die Ergebnisse der Prüfung sind in dem Prüfprotokoll BVS PP 15.2073 EG niedergelegt.

(9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 60079-0:2012+A11:2013	**Allgemeine Anforderungen**
EN 60079-2:2014	**Überdruckkapselung „p“**
EN 60079-11:2012	**Eigensicherheit „i“**
EN 60079-15:2010	**Zündschutzart „n“**
EN 60079-31:2014	**Schutz durch Gehäuse „t”**

(10) Falls das Zeichen “X” hinter der Bescheinigungsnummer steht, wird in der Anlage zu dieser Bescheinigung auf besondere Bedingungen für die sichere Anwendung des Gerätes hingewiesen.

(11) Diese Bescheinigung bezieht sich nur auf die Konzeption und die Baumusterprüfung des beschriebenen Gerätes in Übereinstimmung mit der Richtlinie 94/9/EG.
Für Herstellung und Inverkehrbringen des Gerätes sind weitere Anforderungen der Richtlinie zu erfüllen, die nicht durch diese Bescheinigung abgedeckt sind.

(12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

II 3G Ex nA nC ic [pzc] IIC T6 Gc; T_a = 40°C
II 3G Ex nA nC ic [pzc] IIC T5 Gc; T_a = 60°C

II 3D Ex tc ic [pzc] IIIB T85°C Dc; T_a = 60°C
II 3D Ex tc ic [pzc] IIIC T85°C Dc; T_a = 60°C

DEKRA EXAM GmbH
Bochum, den 09.06.2015

Zertifizierungsstelle

Fachbereich

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.

DAkkS Deutsche Akkreditierungsstelle D-ZE-12069-03-00

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Deutschland
Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

(13) Anlage zur

(14) **Baumusterprüfbescheinigung**
BVS 15 ATEX E 048 X

(15) 15.1 Gegenstand und Typ

Überdruckkapselungssteuergerät Typ FS830 / FS840

15.2 Beschreibung

Die Überdruckkapselungssysteme Typ FS830 und Typ FS840 dienen zum Aufbau von explosionsgeschützten elektrischen Betriebsmitteln in der Zündschutzart Überdruckkapselung nach EN/IEC 60079-2 sowie EN/IEC 60079-31. Das Steuergerät FS840.*.* ist mit Gehäuse und integriertem Auslassventil ausgestattet. Das Steuergerät FS830.*.* ist auf der Rückseite offen und für den Frontplatteneinbau bestimmt.

Typenschlüssel

Steuergerät FS840.*.* .* .*

Netzspannung:	
230 V AC	.0
115 V AC	.2
24 V DC	.6
Druckmessbereich:	
Standard 0 – 18mbar	.0
Erweitert 0 - 27mbar	.1

Steuergerät FS830.*.* .* .*

Netzspannung:	
230 V AC	.0
115 V AC	.2
24 V DC	.6
Druckmessbereich:	
Standard 0 – 18mbar	.0
Erweitert 0 - 27mbar	.1

Luftauslass LA830 .*

Bauform:	
Durchmesser 40 mm	.0
Durchmesser 16 mm	.1

15.3 Kenngrößen

FS840.*.* and FS830.*.*

Klemme	Spannung	Strom	Leistung	Bemerkung
1, 2	U_m = 250 VAC U_m = 250 VAC U_m = 30 V DC	I_m = 5 A bei AC1 I_m = 1.2 A bei AC15 I_m = 5 A bei DC1	P_m = 1500 VA P_m = 300 VA P_m = 150 W	Meldekontakt 1
3, 4	U_m = 250 VAC U_m = 250 VAC U_m = 30 V DC	I_m = 5 A bei AC1 I_m = 1.2 A bei AC15 I_m = 5 A bei DC1	P_m = 1500 VA P_m = 300 VA P_m = 150 W	Meldekontakt 1
5, 6				Anschluss für das Spülmittelventil
7/8, 9/10	U_n = 230 VAC U_n = 115 VAC U_n = 24 V DC			Speisung

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.

DAkkS Deutsche Akkreditierungsstelle D-ZE-12069-03-00

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Deutschland
Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

(16) Prüfprotokoll

BVS PP 15.2073 EG, Stand 09.06.2015

(17) Besondere Bedingungen für die sichere Anwendung

Die Prüfung des überdruckgekapselten Gehäuses mit der Festlegung der pneumatischen Parameter und der Temperaturklasse muss gesondert bescheinigt werden.

Der Bypass darf nur aktiviert sein, wenn nicht die Gefahr des Auftretens von explosionsfähiger Atmosphäre besteht.

Alle Leitungen sind fest zu verlegen.

Das Spülventil muss für den Betrieb in explosionsgefährdeten Bereichen, in der Betriebsmittel der Kategorie 3 erforderlich sind, und die am Einsatzort vorliegenden Bedingungen geeignet sein. Eine für das Spülventil geeignete Sicherung kann in dem Steuergerät Typ FS840.*.* oder FS830.*.* vorgeschaltet werden.

Beim FS830.*.* ist eine Schutzart von:
IP54 bei Anwendungen für II 3G, und
IP6X bei Anwendungen für II 3D bei Gerätegruppe IIIC, und
IP5X bei Anwendungen für II 3D bei Gerätegruppe IIIB erforderlich.

Dieses Zertifikat darf nur vollständig und unverändert weiterverbreitet werden.

DAkkS Deutsche Akkreditierungsstelle D-ZE-12069-03-00

DEKRA EXAM GmbH, Dinnendahlstraße 9, 44809 Bochum, Deutschland
Telefon +49.234.3696-105, Telefax +49.234.3696-110, zs-exam@dekra.com

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx BVS 15.0037X	issue No.:0	Certificate history:
Status:	**Current**		
Date of Issue:	**2015-04-27**	Page 1 of 4	

Applicant: **Gönnheimer Elektronic GmbH**
Dr.-Julius-Leber-Str. 2
67433 Neustadt an der Weinstraße
Germany

Electrical Apparatus: **Pressurization system type FS830 / FS840**
Optional accessory:

Type of Protection: **Equipment protection by intrinsic safety "i", Equipment protection by type of protection "n", Equipment protection by pressurized enclosure "p", Equipment dust ignition protection by enclosure "t"**

Marking:

Ex nA nC ic [pzc] IIC T6 Gc; T_a = 40 °C
Ex nA nC ic [pzc] IIC T5 Gc; T_a = 60 °C

Ex tc ic [pzc] IIIB T85°C Dc; T_a = 60 °C
Ex tc ic [pzc] IIIC T85°C Dc; T_a = 60 °C

Approved for issue on behalf of the IECEx Certification Body: Dr. F. Eickhoff

Position: Deputy Head of Certification Body

Signature:
(for printed version)

Date: 2015-04-27

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

DEKRA EXAM GmbH
Dinnendahlstrasse 9
44809 Bochum
Germany

DEKRA EXAM GmbH

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 15.0037X

Date of Issue: **2015-04-27** Issue No.: **0**

Manufacturer: **Gönnheimer Elektronic GmbH**
Dr.-Julius-Leber-Str. 2
67433 Neustadt an der Weinstraße
Germany

Additional Manufacturing location (s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-15 : 2010 Edition: 4	Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
IEC 60079-2 : 2014-07 Edition: 6	Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure "p"
IEC 60079-31 : 2013 Edition: 2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
DE/BVS/ExTR15.0034/00

Quality Assessment Report:

DE/TUN/QAR10.0006/04

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 15.0037X

Date of Issue: **2015-04-27** Issue No.: **0**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

General product information:

The pressurization systems type FS840.x.x and FS830.x.x are used for construction of electrical apparatus type of protection pressurized enclosure in acc. with IEC 60079-2 resp. IEC 60079-31. The control unit of the FS840.x.x is erected with a housing and an exhaust valve. For panel-mounting the housing of the FS830.x.x is open at the rear side.

The system consists of:

the Control unit type FS840.*.* or FS830.*.* (instead of ** in the complete denomination letters and numerals will be inserted which characterize modifications)	Type of protection Ex nA nC ic [pzc] IIC T6 Gc for -20 °C ≤ Ta ≤ +40 °C Ex nA nC ic [pzc] IIC T5 Gc for -20 °C ≤ Ta ≤ +60 °C resp. Ex tc ic [pzc] IIIB T85°C Dc for -20 °C ≤ Ta ≤ +60 °C Ex tc ic [pzc] IIIC T85°C Dc for -20 °C ≤ Ta ≤ +60 °C

Type designation:

See Annex

CONDITIONS OF CERTIFICATION: YES as shown below:

- The pressurized enclosure with determination of the pneumatic parameters has to be tested and certified separately´

- The activation of the bypass must be prevented in occurrence of explosive atmosphere

- All pipes and wires have to be installed fix

- The purge valve must be suitable for EPL Gc and Dc. An appropriate fuse can be connected in the control unit FS840.*.* or FS830.*.*

- FS830.*.*: Protection of IP54 for applications II 3G and IP6X for group IIIC, IP5X for group IIIB for applications II 3D essential

IECEx Certificate of Conformity

Certificate No.: IECEx BVS 15.0037X

Date of Issue: **2015-04-27** Issue No.: **0**

EQUIPMENT(continued):

Parameters:

FS840.*.* and FS830.*.*

terminal	voltage	current	power	remark
1,2	U_m = 250 VAC U_m = 250 VAC U_m = 30 V DC	I_m = 5 A bei AC1 I_m = 1.2 A bei AC15 I_m = 5 A bei DC1	P_m = 1500 VA P_m = 300 VA P_m = 150 W	signal contact 1
3,4	U_m = 250 VAC U_m = 250 VAC U_m = 30 V DC	I_m = 5 A bei AC1 I_m = 1.2 A bei AC15 I_m = 5 A bei DC1	P_m = 1500 VA P_m = 300 VA P_m = 150 W	signal contact 1
5,6				contact for the flush medium valve
7/8, 9/10	U_n = 230 VAC U_n = 115 VAC U_n = 24V DC			supply

Annex: BVS_15_0037x_Gönnheimer_Annex.pdf

IECEx Certificate of Conformity

Certificate No.: **IECEx BVS 15.0037 X**
Annex

Type designation

Control unit FS840	.*	.*
Mains voltage:		
230 V AC	.0	
115 V AC	.2	
24 V DC	.6	
pressure measurement range:		
standard 0 – 18mbar		.0
extended 0 - 27mbar		.1

Control unit FS830	.*	.*
Mains voltage:		
230 V AC	.0	
115 V AC	.2	
24 V DC	.6	
pressure measurement range:		
standard 0 – 18mbar		.0
extended 0 - 27mbar		.1

air exhaust LA830	.*
design:	
diameter 40 mm	.0
diameter 16 mm	.1